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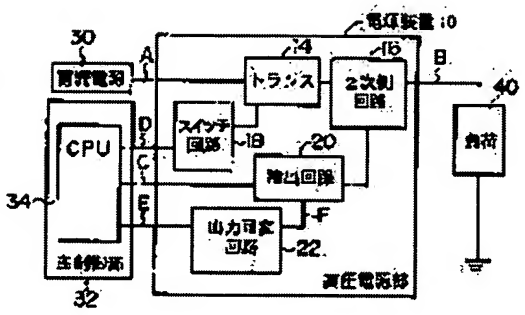
(54) POWER UNIT

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a power unit which can perform highly accurate output control at a low cost and moreover without requiring complicated control.

SOLUTION: When a CPU 34 controls the application/nonapplication to the primary winding of a transformer 14 of DC voltage generated by DC power source 30, so that the output voltage B reaches an object level by using a switch circuit 18, based on the output state detection voltage C output from a detection circuit 20, the detecting circuit 20 performs operation using the level of a signal, which shows the magnitude of output voltage B and the level of the variable reference voltage F inputted from an output variable circuit 22 and outputs it as output state detection voltage C to the CPU 34. Here, the output variable circuit 22 generates variable reference voltage F, so that the output state detection voltage C reaches predetermined certain level.



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* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to a power unit and relates to the power unit controlled so that output power serves as desired value by switching input power in more detail.
[0002]
[Description of the Prior Art] With the image formation equipment which is represented by a printer, a copying machine, etc. of an electrophotography method and which forms an image through a photo conductor, two or more loads which have each functions, such as electrification, development, an imprint, exfoliation, and cleaning, are prepared in the perimeter of a photo conductor, specified voltage or a convention current is supplied to these loads from a power unit, and predetermined processing is performed.
[0003] With this kind of image formation equipment, the information which shows the timing of the electric power supply to each load of the above perimeters of a photo conductor to a power unit, the information (henceforth "output potential information") which shows the potential of power to supply are sent from the control unit which performs overall process control of the image formation equipment concerned, and a power unit performs the electric power supply to each load based on such information. That is, it consists of this power unit so that output power level can be changed by changing the output potential information transmitted from a control device, and the power of the request according to various process demands is supplied to the load by this.
[0004] The voltage level or the load impressed to a load was controlling by controlling so that the difference of the output level and the output target level which the monitor signal which detected output-voltage level or output current level by the detector, fed back to the control section of a power unit as a monitor signal when the power unit supplied power to a load here, and was fed back by this control section shows becomes small so that the current level flow is in agreement with output target level.
[0005] By the way, that in which is required to make wide range the output adjustable range of such a power unit, and it has the output adjustable range (for example, range to 100V to 1kV) which is about 10 times with advanced features in recent years and multi-functionalization of image formation equipment is common.
[0006] When the output of a power unit is controlled by the control section which consisted of digital circuits, such as CPU (Central Processing Unit) and ASIC (Application Specific Integrated Circuit), on the other hand, It is necessary to make the electrical-potential-difference range of the monitor signal according to the output level of a power unit into the range from 0V to 5V. Furthermore, in order to stabilize and control to become output adjustable within the limits mentioned above, in consideration of the margin of the maximum level, it needed to consider as the range from about 0.4V to about 4.0V.
[0007] That is, the permission fluctuation range on the design to an output (10% as an example) is beforehand set to the power unit, and even if it changes an output within the limits of this, in order to make it the electrical potential difference of a monitor signal not exceed 5V, it is necessary to make the maximum electrical potential difference into about 4.0V.
[0008] Therefore, the voltage level of a monitor signal when a target output is small became minute, and there was a trouble that control became unstable or an output ripple increased in response to the effect of the noises (for example, noise by other high-pressure discharge etc.) in a feedback path, so that the output adjustable range was wide.
[0009] As a technique which can be applied in order to solve this trouble, with the technique given in the patent No. 2829022 official report, while making it become the sufficiently high electrical potential difference of extent which can disregard the detecting signal (monitor signal) fed back to a control section as compared with the noise produced to a communication link harness, the effect of a noise was avoided by lowering the pressure by the control-section side on an operating-range electrical potential difference (range from 0V to 5V), and detecting an output level.

[0010] Moreover, it has two or more output voltage sensing lines where division ratios differ, and enabled it to detect an output level with high precision as a detector of a power unit with a technique given in JP,9-319266,A by switching an output voltage sensing line according to target output voltage.
[0011]
[Problem(s) to be Solved by the Invention] However, with a technique given in the above-mentioned patent No. 2829022 official report, since the effect by the noise from the outside to a monitor signal changed with magnitude of a target output, there was a trouble that a highly precise output control could not be performed. That is, when controlling a target output to become the maximum of the output adjustable range, a monitor signal serves as the maximum electrical potential difference, the effect by the noise to the monitor signal at this time becomes comparatively small, but when controlling a target output to become the minimum value of the output adjustable range, a monitor signal may serve as the minimum electrical potential difference, and the effect by the noise at this time may be several 10 times as compared with the case where a monitor signal serves as the maximum electrical potential difference. Therefore, the precision of feedback control will fall, so that a target output is small in this case.
[0012] Moreover, since above-mentioned JP,9-319266,A needed to be equipped with two or more output voltage sensing lines where division ratios differ with the technique of a publication, there was a trouble that cost became high. Moreover, with this technique, since the output voltage sensing line was alternatively switched according to target output voltage, feedback control according to an output voltage sensing line needed to be performed, and there was also a trouble that control was complicated.
[0013] This invention is accomplished in order to cancel the above-mentioned trouble, and it aims at offering the power unit which is low cost about a highly precise output control, and can be performed, without requiring complicated control.
[0014]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, a power unit according to claim 1 It is the power unit controlled so that output power serves as desired value by switching input power based on the switching signal according to the detection value which shows the condition of output power. It has a detection means to generate said detection value based on the value and reference value which show the magnitude of said output power, and a setting means to set up said reference value based on the input indication signal corresponding to said desired value so that said detection value may turn into a predetermined value.
[0015] According to the power unit according to claim 1, the detection value which shows the condition of output power with a detection means based on the value and reference value which show the magnitude of output power is generated. In addition, the gestalt generated so that it may become the value which added the value which shows the magnitude of output power, and the reference value as a gestalt which generates a detection value, for example, The gestalt generated so that it may become the value which subtracted the reference value from the value which shows the magnitude of output power, the gestalt generated so that it may become the value which carried out the multiplication of the value which shows the magnitude of output power, and the reference value, the gestalt generated so that it may become the value which did the division of the value which shows the magnitude of output power with the reference value are applicable.
[0016] Moreover, in a power unit according to claim 1, based on the input indication signal corresponding to the above-mentioned desired value, the above-mentioned reference value is set up by the setting means so that a detection value may turn into a predetermined value. In addition, the way which is a fixed value tends to control the above-mentioned predetermined value, and although it is desirable, it is not limited to this but can also be made into the value of the predetermined range.
[0017] Thus, while generating a detection value based on the value and reference value which show the magnitude of output power according to the power unit according to claim 1 Since the above-mentioned reference value is set up based on the input indication signal corresponding to the desired value of output power so that this detection value may turn into a predetermined value Since a detection value can be made into a predetermined value or the value of the near, it cannot be concerned with the desired value of output power but effect by the noise from the outside to a detection value can be considered as abbreviation regularity, A detection value can perform a highly precise output control as compared with the conventional technique of changing according to the desired value of output power.
[0018] Moreover, since according to this invention it is controllable so that output power serves as desired value by controlling so that a detection value turns into a predetermined value defined beforehand, a detection value can make an output control simple as compared with the conventional technique of changing according to the desired value of output power.
[0019] Furthermore, since it is not necessary to have two or more output voltage sensing lines where division ratios differ according to this invention, a power unit can be constituted in low cost.

[0020] In addition, as for said predetermined value in invention according to claim 1, it is desirable like a power unit according to claim 2 that they are the upper limit of the tolerance of said detection value or a value near the upper limit. By this, effect by the noise from the outside to a detection value can be relatively made into a small thing, and a highly precise output control can be performed.
[0021] Moreover, as for said input indication signal in invention according to claim 1 or 2, it is desirable like a power unit according to claim 3 that it is a digital signal corresponding to said desired value. By this, when inputting an input indication signal from a distant place comparatively, the effect of the noise from the outside to an input indication signal can be avoided, and a highly precise output control can be performed. In addition, all the digital signals that can show magnitude of a reference value, such as an PWM (Pulse Width Modulation, Pulse Density Modulation) signal and a Pulse-Amplitude-Modulation (Pulse Amplitude Modulation, Pulse Amplitude Modulation) signal, are applicable to the above-mentioned digital signal.
[0022] However, the conversion means for changing a digital signal into an analog signal in this case is needed, and there is a possibility that cost may become high. Therefore, when there is little effect of the noise from the outside to an input indication signal, it can also consider as the gestalt which carries out the direct input of the input indication signal as a signal (analog signal) which shows a reference value. In this case, since the above-mentioned conversion means are reducible, equipment can be low-cost-ized.
[0023]
[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained to a detail with reference to a drawing. First, with reference to drawing 1 , the fundamental configuration of the power unit concerning this invention is explained.
[0024] As shown in this drawing, this power unit 10 The secondary circuit 16 constituted including a transformer 14, a rectification smoothing circuit, etc. which have the primary coil and secondary coil which are not illustrated, the switching circuit 18 which is intermittent in the primary coil of a transformer 14 according to the inputted PWM signal D, and output voltage B are detected. It is constituted including the detector 20 outputted as an output state detection electrical potential difference C, and the output adjustable circuit 22 which generates the adjustable reference voltage F at the time of detection of the output voltage B by the detector 20. In addition, the magnitude of the adjustable reference voltage F generated by the output adjustable circuit 22 can be changed with the output voltage adjustable signal E inputted into the output adjustable circuit 22.
[0025] The outgoing end of DC power supply 30 which generate the predetermined direct current voltage A is connected to one terminal of the primary coil of a transformer 14, and the direct current voltage A generated by DC power supply 30 is impressed to one terminal of the primary coil of a transformer 14. Moreover, the outgoing end of a switching circuit 18 is connected to the other-end child of the primary coil of a transformer 14. Therefore, switching operation of a switching circuit 18 is performed according to the PWM signal D, and impression / un-impressing are performed according to this switching operation. [of the direct current voltage A by DC power supply 30 to the primary coil of a transformer 14]
[0026] On the other hand, the secondary coil of a transformer 14 is connected to the input edge of the secondary circuit 16, one outgoing end of the secondary circuit 16 is connected to one input edge of a detector 20, and the input edge of another side of a detector 20 is further connected to the outgoing end of the output adjustable circuit 22.
[0027] Moreover, the input edge of a switching circuit 18 is connected to the outgoing end which outputs the PWM signal D of CPU34 with which the main control section 32 which manages actuation of a power unit 10 is equipped, the input edge of the output adjustable circuit 22 is connected to the outgoing end which outputs the output voltage adjustable signal E of CPU34, and the outgoing end which outputs the output state detection electrical potential difference C of a detector 20 is connected to the input edge of CPU34. In addition, the outgoing end of another side of the secondary circuit 16 corresponds to the external load 40, and is connected to a load 40.
[0028] Hereafter, the gestalt of two concrete operations of the above power units 10 is explained to a detail.
[0029] The [1st operation gestalt] With reference to drawing 2 , the circuitry of the power unit 10 concerning a **** 1 operation gestalt is explained concretely first. In addition, in this drawing, illustration of DC power supply 30 and the main control section 32 is omitted.
[0030] As shown in this drawing, the switching circuit 18 of the power unit 10 concerning a **** 1 operation gestalt is constituted including the resistance R1 for partial pressures and resistance R2, and the transistor TR1 that functions as switching elements. One terminal of resistance R1 is connected to the outgoing end which outputs the PWM signal D of CPU34, and the other-end child of resistance R1 is grounded through resistance R2 while connecting with the base of a transistor TR1. Moreover, the emitter of a transistor TR1 is grounded and the collector is connected to the other-end child of the primary coil of the transformer 14 by which one terminal was connected to the outgoing end which outputs the direct current voltage A of DC power supply 30.

[0031] Thus, in the constituted switching circuit 18, according to the PWM signal D, impression / un-impressing to the primary coil of a transformer 14 are performed, and induction of the alternation current is carried out to the secondary coil of a transformer 14 by this. [of the direct current voltage A from DC power supply 30]
[0032] Moreover, the secondary circuit 16 concerning a **** 1 operation gestalt is constituted including diode D1 and a capacitor C1, and the cathode of diode D1 is respectively connected to one terminal of the capacitor C1 by which the other-end child was grounded by it while connecting with one terminal of the secondary coil of a transformer 14 to the other-end child of the secondary coil of a transformer 14 for the anode. Therefore, in the secondary circuit 16, the rectification smoothing circuit is constituted by diode D1 and the capacitor C1, and it rectifies and carries out smooth [of the alternation current by which induction was carried out to the secondary coil of a transformer 14].
[0033] On the other hand, while connecting with the anode of the diode [in / through resistance R3 / the detector 20 is constituted including the operational amplifier OP, and / in the reversal input edge of an operational amplifier OP / the secondary circuit 16] D1, it connects with an own outgoing end through resistance R4, and connects with the own noninverting input edge through the capacitor C2. Moreover, it connects with the input edge of CPU34 through resistance R5, and the outgoing end of an operational amplifier OP outputs the output state detection electrical potential difference C to CPU34.
[0034] Moreover, the output adjustable circuit 22 is equipped with the transistor TR2 grounded through resistance R7 while the base is connected to the outgoing end which outputs the output voltage adjustable signal E of CPU34 through resistance R6. The emitter of this transistor TR2 is grounded and the collector is connected to the base of a transistor TR3 through resistance R8. Moreover, while the emitter of a transistor TR3 is connected to the own base through resistance R9, the direct current voltage of 4V is supplied from the constant-voltage component which is not illustrated, and the collector is connected to the noninverting input edge of the operational amplifier OP in a detector 20 through resistance R11. Furthermore, the terminal connected to the collector of the transistor TR3 of resistance R11 is grounded through resistance R10, and the terminal connected to the noninverting input edge of the operational amplifier OP of resistance R11 is grounded through the capacitor C3.
[0035] In addition, the anode of the diode D1 in the secondary circuit 16 is connected to the capacitive load 40 through resistance R12.
[0036] Here, the output voltage adjustable signal E is generated by CPU34 as an PWM signal. Therefore, in the output adjustable circuit 22, in a high-level period, a transistor TR2 and a transistor TR3 are turned on, the output voltage adjustable signal E is made high-level [the collector of a transistor TR3] in this "on" period, and this level is filtered with the filter constituted by resistance R10, resistance R11, and the capacitor C3. 4.0V are the maximum voltage level, and adjustable reference voltage F outputted from the output adjustable circuit 22 is made the voltage level according to the duty of the output voltage adjustable signal E by this.
[0037] Moreover, in a detector 20, since the adjustable reference voltage F is inputted into the noninverting input edge of an operational amplifier OP, the output state detection electrical potential difference C of the voltage level which added the adjustable reference voltage F to the voltage drop in resistance R4 is outputted to CPU34.
[0038] In CPU34 which, on the other hand, starts a **** 1 operation gestalt, in case drive control of a power unit 10 is performed, it preceded controlling the duty of the output voltage adjustable signal E so that the output state detection electrical potential difference C always serves as fixed level, and performing drive control of a power unit 10, every [of adjustable within the limits of output voltage B] various output voltage B was beforehand asked for the duty of the output voltage adjustable signal E, and it has memorized in the memory which is not illustrated at the table format. Below, the procedure in this case is explained. In addition, resistance R3 explains the case where the range of 50 M omega and resistance R4 is 0V to -5.0kV, and the adjustable range of output voltage B sets [resistance] constant the output state detection electrical potential difference C by 40kohm 4.0V here.
[0039] When B is the output voltage of -5.0kV, for resistance R3, the current of 100microA (= 5.0kV / 50 M omega) flows, and the voltage drop in resistance R4 is set to 4.0V (=100microAx40kohm). Therefore, in order to set the output state detection electrical potential difference C to 4.0V, the duty of the output voltage adjustable signal E at this time becomes 0% that what is necessary is just to set adjustable reference voltage F to 0V.
[0040] Moreover, when B is the output voltage of -2.5kV, for resistance R3, the current of 50microA (= 2.5kV / 50 M omega) flows, and the voltage drop in resistance R4 is set to 2.0V (=50microAx40kohm). Therefore, in order to set the output state detection electrical potential difference C to 4.0V, the duty of the output voltage adjustable signal E at this time becomes 50% that what is necessary is just to set adjustable reference voltage F to 2.0V.
[0041] The result of having asked every various output voltage B for the duty of the above output voltage adjustable signal E is shown in Table 1.
[0042]
[Table 1]

出力電圧 B（kV）	出力電圧可変信号Eのデューティ（%）	可変基準電圧 F（V）	出力状態検出電圧 C（V）
−5.0	0	0.0	4.0
−4.0	20	0.8	4.0
−3.0	40	1.6	4.0
−2.5	50	2.0	4.0
−2.0	60	2.4	4.0
−1.0	80	3.2	4.0
0.0	100	4.0	4.0

[0043] In addition, in CPU34, only the duty of the output voltage B shown in Table 1 and the output voltage adjustable signal E is memorized in the memory which does not carry out [above-mentioned] illustration.
[0044] The value which the adjustable reference voltage F shows [the value which the output adjustable circuit 22 shows to the detection means of this invention, and the output state detection electrical potential difference C shows / a detector 20 / to the setting means of this invention] to the detection value of this invention is equivalent to the reference value of this invention, and the output voltage adjustable signal E is respectively equivalent to the input indication signal of this invention.
[0045] Next, with reference to drawing 3 , the operation at the time of CPU34 performing drive control of a power unit 10 is explained. In addition, in case drawing 3 performs drive control of a power unit 10, it is a flow chart which shows the flow of the control program performed by CPU34. Moreover, the case where drive control of a power unit 10 is performed based on the directions from the control unit which is positioned by the high order and which is not illustrated from the main control section 32 is explained here.
[0046] At step 200 of this drawing, if input waiting of the signal which shows the output voltage level made into the target of the power unit 10 from the control device which does not carry out [above-mentioned] illustration is performed and this signal is inputted, it will shift to step 202.
[0047] It reads from the memory which does not illustrate the duty of the output voltage adjustable signal E corresponding to the output voltage level which the signal inputted from the control device shows at step 202, and at the following step 204, the oscillation of the output voltage adjustable signal E made into the read duty is started, and the output of the PWM signal D made into predetermined duty is further started by the following step 206.
[0048] At the following step 208, it judges whether there were any directions of the purport which changes the output voltage level made into a target from a control device. That is, a control device outputs the signal which shows the output voltage level after modification to CPU34, when changing the output voltage level made into the target of a power unit 10. therefore -- as the signal with which the judgment of whether there were any directions of the purport which changes the output voltage level in this step 208 shows output voltage level from a control device -- till then -- **** -- when what shows different output voltage level is inputted, it judges with a thing with directions of the purport into which output voltage level is changed.
[0049] When judged with there having been directions of the purport which changes target output voltage level in step 208, it shifts to step 210 (when an affirmation judging is carried out). it reads from the memory which does not illustrate the duty of the output voltage adjustable signal E corresponding to the output voltage level after modification, and after changing so that it may become the duty in which the duty of the output voltage adjustable signal E carried out [above-mentioned] reading appearance at the following step 212, it shifts to step 214.
[0050] It shifts to step 214, without performing processing of the above-mentioned step 210 and step 212, when judged with on the other hand there having been no directions of the purport which changes target output voltage level in the above-mentioned step 208 (i.e., without it changing the duty of the output voltage adjustable signal E) (when a negative judging being carried out).
[0051] At step 214, the output state detection electrical potential difference C (monitor value) inputted from the detector 20 of a power unit 10 is incorporated, and the duty of the PWM signal D is calculated in the following step 216 according to the incorporated monitor value. When the operation of the duty in this case has the output state detection electrical potential difference C bigger than 4.0V, it draws as that to which only predetermined duty made small duty of the PWM signal D at that time, and when the output state detection electrical potential difference C is smaller than 4.0V, it accomplishes by deriving as that to which only predetermined duty enlarged duty of the PWM signal D at that time. Here, the above-mentioned predetermined duty may be set up as a rate to the duty till then, may be beforehand set up as a fixed value, and may be further set up as duty of the magnitude according to the difference of the output state detection electrical potential difference C and 4.0V.
[0052] At the following step 218, the duty of the PWM signal D is adjusted so that it may become the duty drawn in the above-mentioned step 216, and in the following step 220, when it judges whether the power output from a power

unit 10 is continued, and continuing (in the case of an affirmation judging) and it stopped continuing return and a power output to the above-mentioned step 208 (at the time of becoming a negative judging), it shifts to step 222. In addition, the judgment of whether to continue the power output from the power unit 10 in this step 220 is performed based on whether the indication signal of a purport which suspends a power output was inputted from a control unit.
[0053] While being controlled by repeat processing of the above step 208 thru/or step 220 to become the duty corresponding to the output voltage level after modification so that the duty of the output voltage adjustable signal E is changed and the voltage level of the output state detection electrical potential difference C is set to 4.0V when there are directions of the purport which changes output voltage level from a control device, the switching operation of a switching circuit 18 is controlled so that the output state detection electrical potential difference C becomes fixed 4.0V.

[0054] At step 222, the output of the PWM signal D is suspended and this control program is ended after that.
[0055] As explained to the detail above, in the power unit concerning a **** 1 operation gestalt While generating the output state detection electrical potential difference C of the level adding the level of a signal and the level of the adjustable reference voltage F which show the magnitude of output voltage B Since the level of the adjustable reference voltage F is set up based on the output voltage adjustable signal E corresponding to the desired value of output voltage B so that the level of this output state detection electrical potential difference C may turn into predetermined level (the gestalt of this operation 4.0 V) Since level of the output state detection electrical potential difference C can be made into the above-mentioned predetermined level or the level of the near, it cannot be concerned with the desired value of output voltage B but the effect by the noise from the outside to the output state detection electrical potential difference C can be set constant, A highly precise output control can be performed as compared with the technique in which the level of the output state detection electrical potential difference C changes according to the desired value of output voltage B.
[0056] Moreover, since it is controllable so that output voltage B serves as desired value by controlling by the power unit concerning a **** 1 operation gestalt so that the output state detection electrical potential difference C serves as predetermined level defined beforehand, as compared with the technique of changing according to the desired value of output voltage B, the level of the output state detection electrical potential difference C can make an output control simple, and can contribute to the simplification of a control program, reduction of a CPU load, etc.
[0057] Moreover, since it is not necessary to have two or more output voltage sensing lines where division ratios differ, a power unit can consist of power units concerning a **** 1 operation gestalt in low cost.
[0058] Moreover, in the power unit concerning a **** 1 operation gestalt, since the above-mentioned predetermined level is made into the level of the upper limit of the permissible level range of the output state detection electrical potential difference C (for example, the range of 0.4V-4.0V), effect by the noise from the outside to the output state detection electrical potential difference C can be relatively made into a small thing, and a highly precise output control can be performed.
[0059] Furthermore, in the power unit concerning a **** 1 operation gestalt, since the output voltage adjustable signal E is made into the PWM signal (digital signal) corresponding to the desired value of output voltage B, when inputting the output voltage adjustable signal E from a distant place comparatively, the effect of the noise from the outside to the output voltage adjustable signal E can be avoided, and a highly precise output control can be performed.
[0060] The [2nd operation gestalt] Although it inputted into the output adjustable circuit 22 and one gestalt in the case of generating the adjustable reference voltage F which is an analog signal according to the duty of the inputted PWM signal was explained from CPU34 with the above-mentioned 1st operation gestalt by making the output voltage adjustable signal E into an PWM signal (digital signal), a **** 2 operation gestalt explains one gestalt in the case of CPU34 generating the adjustable reference voltage F directly, and inputting into a power unit.
[0061] First, with reference to drawing 4 , the configuration of power unit 10' concerning a **** 2 operation gestalt is explained. As shown in this drawing, in power unit 10' concerning a **** 2 operation gestalt, the interior of power unit 10' is not equipped with the output adjustable circuit 22, but it differs from the above-mentioned 1st operation gestalt in that CPU34 generates the adjustable reference voltage F directly, and is inputted into the noninverting input edge of the operational amplifier OP in a detector 20. Therefore, with a **** 2 operation gestalt, the wiring L from the input edge of the adjustable reference voltage F to the noninverting input edge of an operational amplifier OP is equivalent to the setting means of this invention.
[0062] Therefore, with the **** 2 operation gestalt, it preceded performing drive control of power unit 10', every [of adjustable within the limits of output voltage B] various output voltage B was beforehand asked for the adjustable reference voltage F, and it has memorized in the memory which is not illustrated at the table format. That is, in the main control section 32 concerning a **** 2 operation gestalt, the output voltage B shown in Table 1 and the adjustable reference voltage F are memorized in the memory which does not carry out [above-mentioned] illustration.

[0063] Next, with reference to drawing 5 , the operation at the time of CPU34 performing drive control of power unit 10' is explained. In addition, in case drawing 5 performs drive control of power unit 10', it is a flow chart which shows the flow of the control program performed by CPU34. Moreover, the step number same about the step which performs the same processing as drawing 3 in drawing 5 as drawing 3 is attached, and the explanation is omitted.
[0064] At step 202' of drawing 5 , it reads from the memory which does not carry out [above-mentioned] illustration of the level of the adjustable reference voltage F corresponding to the output voltage level which the signal inputted at step 200 shows, and the output of the adjustable reference voltage F of the read level is started by following step 204'. on the other hand, in step 210', it reads from the memory which does not carry out [above-mentioned] illustration of the level of the adjustable reference voltage F corresponding to the output voltage level after modification obtained at step 208, and after changing so that it may be set to the level in which the level of the adjustable reference voltage F carried out [above-mentioned] reading appearance by following step 212', it shifts to step 214.
[0065] As explained to the detail above, in the power unit concerning a **** 2 operation gestalt While generating the output state detection electrical potential difference C of the level adding the level of a signal and the level of the adjustable reference voltage F which show the magnitude of output voltage B Since the level of the adjustable reference voltage F is set up corresponding to the desired value of output voltage B so that the level of this output state detection electrical potential difference C may turn into predetermined level Since level of the output state detection electrical potential difference C can be made into the above-mentioned predetermined level or the level of the near, it cannot be concerned with the desired value of output voltage B but the effect by the noise from the outside to the output state detection electrical potential difference C can be set constant, A highly precise output control can be performed as compared with the technique in which the level of the output state detection electrical potential difference C changes according to the desired value of output voltage B.
[0066] Moreover, since it is controllable so that output voltage B serves as desired value by controlling by the power unit concerning a **** 2 operation gestalt so that the output state detection electrical potential difference C serves as predetermined level defined beforehand, the level of the output state detection electrical potential difference C can make an output control simple as compared with the technique of changing according to the desired value of output voltage B.
[0067] Moreover, since it is not necessary to have two or more output voltage sensing lines where division ratios differ, a power unit can consist of power units concerning a **** 2 operation gestalt in low cost.
[0068] Moreover, in the power unit concerning a **** 2 operation gestalt, since the above-mentioned predetermined level is made into the level of the upper limit of the permissible level range of the output state detection electrical potential difference C, effect by the noise from the outside to the output state detection electrical potential difference C can be relatively made into a small thing, and a highly precise output control can be performed.
[0069] Furthermore, in the power unit concerning a **** 2 operation gestalt, since it is carrying out the direct input, using the output voltage adjustable signal E as the adjustable reference voltage F, the output adjustable circuits 22 can be reduced as compared with the above-mentioned 1st operation gestalt, and equipment can be low-cost-ized.
[0070] In addition, the circuitry (drawing 2 and drawing 4) concerning each above-mentioned operation gestalt is an example, and it cannot be overemphasized that it can constitute by other circuits which have the same function.
[0071] Moreover, although the case constitute from each above-mentioned operation gestalt as what has the function of adding the level of a signal and the level of the adjustable reference voltage F which shows the level of output voltage B for a detector explained, this invention is not limited to this and can also make into the gestalt which constitutes as what has which calculation function of the function subtracted between each level, the function which carries out multiplication, and function [which does a division] **. In this case, what is necessary is just to set up the value of the adjustable reference voltage F so that it may be set to the fixed level (each above-mentioned operation gestalt 4.0 V) which the result of an operation corresponding to each function defined beforehand.
[0072] Furthermore, although the case where this invention was applied to the power unit of a gestalt controlled by each above-mentioned operation gestalt so that output voltage serves as desired value was explained, this invention is not limited to this and can also be made into the gestalt applied to the power unit of a gestalt controlled so that the output current serves as desired value. In this case, the duty of the output voltage adjustable signal E and the adjustable reference voltage F are beforehand memorized for every various current values of output current within the limits.
[0073]
[Effect of the Invention] While generating a detection value based on the value and reference value which show the magnitude of output power according to this invention Since the above-mentioned reference value is set up based on the input indication signal corresponding to the desired value of output power so that this detection value may turn into a predetermined value Since a detection value can be made into a predetermined value or the value of the near, it

cannot be concerned with the desired value of output power but effect by the noise from the outside to a detection value can be considered as abbreviation regularity, The effectiveness that a detection value can perform a highly precise output control as compared with the conventional technique of changing according to the desired value of output power is acquired.

[0074] Moreover, since according to this invention it is controllable so that output power serves as desired value by controlling so that a detection value turns into a predetermined value defined beforehand, the effectiveness that a detection value can make an output control simple as compared with the conventional technique of changing according to the desired value of output power is acquired.

[0075] Furthermore, since it is not necessary to have two or more output voltage sensing lines where division ratios differ according to this invention, the effectiveness that a power unit can be constituted in low cost is acquired.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The power unit equipped with a detection means is the power unit controlled so that output power serves as desired value by switching input power based on the switching signal according to the detection value which shows the condition of output power, and generate said detection value based on the value and the reference value which show the magnitude of said output power, and a setting means set up said reference value based on the input indication signal corresponding to said desired value so that said detection value may turn into a predetermined value.
[Claim 2] Said predetermined value is a power unit according to claim 1 characterized by being the upper limit of the tolerance of said detection value, or a value near the upper limit.
[Claim 3] Said input indication signal is a power unit according to claim 1 or 2 characterized by being a digital signal corresponding to said desired value.

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
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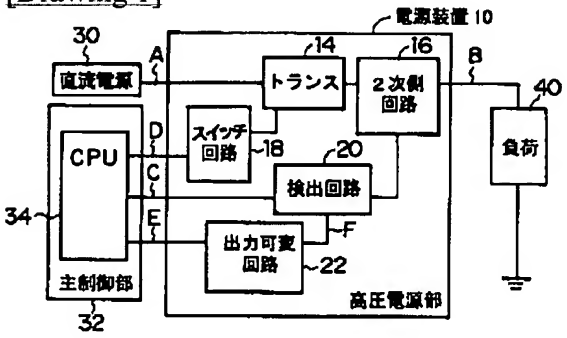
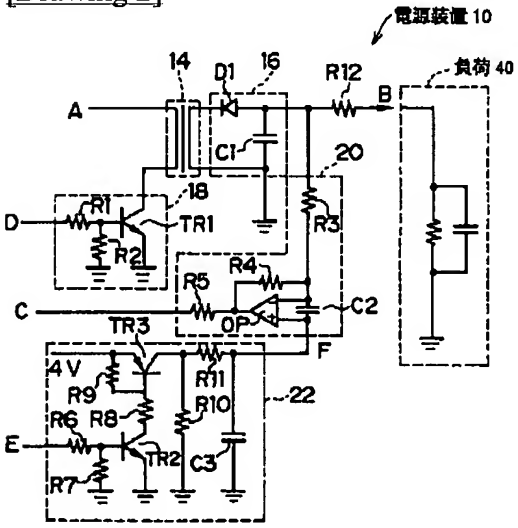
DRAWINGS

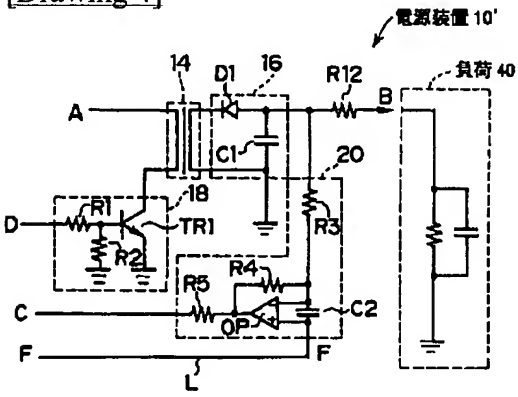
[Drawing 1]



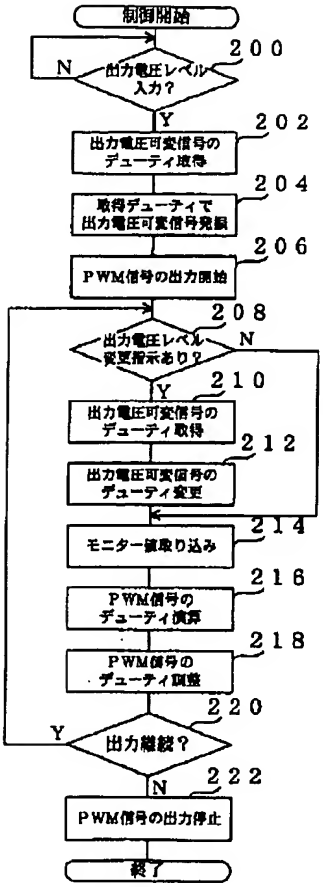
[Drawing 2]



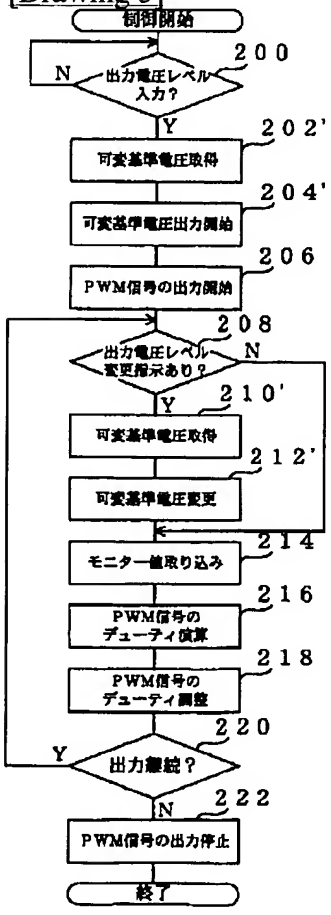
[Drawing 4]



[Drawing 3]


制御開始
200
N
出力電圧レベル入力？
Y
202
出力電圧可変信号のデューティ取得
204
取得デューティで出力電圧可変信号発振
206
PWM信号の出力開始
208
出力電圧レベル変更指示あり？
N
Y
210
出力電圧可変信号のデューティ取得
212
出力電圧可変信号のデューティ変更
214
モニター値取り込み
216
PWM信号のデューティ演算
218
PWM信号のデューティ調整
220
Y
出力継続？
N
222
PWM信号の出力停止
終了

[Drawing 5]


制御開始
200
N
出力電圧レベル入力？
Y
202'
可変基準電圧取得
204'
可変基準電圧出力開始
206
PWM信号の出力開始
208
出力電圧レベル変更指示あり？
N
Y
210'
可変基準電圧取得
212'
可変基準電圧変更
214
モニター値取り込み
216
PWM信号のデューティ演算
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PWM信号のデューティ調整
220
Y
出力継続？
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222
PWM信号の出力停止
終了

[Translation done.]